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SOURCE As indicated

SOVIET ACTIVITIES IN THE ARCTIC AND ANTARCTIC (2)

Soviet Activities in the Arctic and Antarctic is a bimonthly report presenting information extracted from Soviet newspapers, periodicals, and books. This report includes information published up to 19 January 1956.

The report covers all Soviet activities in the arctic and antarctic with the exception of commercial shipping, which appears in the FDD Summary series Transportation, Communications, Electric Power, and Construction in the USSR.

All temperatures in this report are given in degrees centigrade. Numbers in parentheses refer to appended sources.

DRIFT STATIONS

With the departure of the Soviet expedition to the antarctic, press coverage of arctic research has been sharply curtailed. Only the following new information has appeared on Severnyy Polyus-4 and Severnyy Polyus-5.

Severnyy Polyus-4

Gordiyenko, chief of Severnyy Polyus-4, reported by radio in the beginning of November that the station had drifted more than 1,400 kilometers total distance and 570 kilometers straight-line distance (north) in 7 months of operation.(1) This placed the camp in the area of 85-40 N and 179-00 E.(2) For several weeks previous to this, drift speed was unusually high -- 220 kilometers a month.(1)

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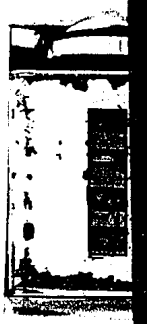


New heating equipment sent from Czechoslovakia has been installed at the camp, two more huts have been set up, and a new electric power station has been put into operation.(3)

[Photo No 195693 shows a portion of Severnyy Polyus-4.]

Severnyy Polyus-5

Preparations for the arrival of polar winter have been pushed at Severnyy Polyus-5, with the completion of a new company room and mess hall, made from three huts flown from Severnyy Polyus-3 after it had been disbanded (4), and the installation of special winches and other equipment.(3) By 4 November, all station members were housed in huts (1) which are heated by new coal stoves sent from Czechoslovakia.(5)

A diesel generator has been assembled in one tent and current will soon be available. Hydrologists Gudkovich and Shesterikov are anxiously waiting for the generator to be turned on because in the past they have been forced to use small batteries for power and their work has been limited accordingly.(5)

By the end of October, Severnyy Polyus-5 had drifted over 1,300 kilometers, moving 500 kilometers northwest of its point of origin. Speed of drift increased at this time and direction changed from westerly to northerly. Minimum depth recorded was 1,100 meters found over the Range imeni Lomonosov at the 85th parallel. Since the station began operating, the floe on which it is located has been reduced to one fiftieth of its original size by ice pressure.(5)

In mid-December, after 8 months of operation, Severnyy Polyus-5 had drifted a total of 1,600 kilometers and a straight-line distance of 800 kilometers. On 17 December, the station's coordinates were 86-28 [N] and 104-07 [E].(6)

N. Volkov, chief of Severnyy Polyus-5, reported in early November that the station had been visited by a group of scientists under the direction of Prof D. L. Laykhman. The group arrived with special equipment for conducting complex observations on ocean heat balance.(1)

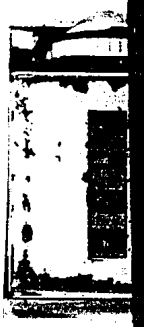
Aerial Supply of Drift Stations

In the latter part of September, an aerial expedition of Polar Aviation left Moscow for the Far North to transfer supplies from shore bases to Severnyy Polyus-4 and Severnyy Polyus-5. By mid-November the group completed its work and all planes returned to Moscow.

The operations of this aerial detachment were described by its chief, I. S. Kotov, as follows:

"Upon arrival at one of the shore bases located on the Arctic Ocean, we found a group of ships unloading cargo. Our task was to transfer more than 150 tons of cargo from this shore base to the stations on the drifting ice. Flying conditions were becoming steadily worse at this time with usual autumn arctic weather of fog, snow, winds, and approaching polar night.

"Preparations for the cargo transfer began with the construction of landing strips on the ice. At Severnyy Polyus-5, a new strip was built 7-8 kilometers from the camp, using tractors flown in from Severnyy Polyus-4. The work was completed in a few days, and the area was marked with lights and a radio station was set up.



"With the completion of a similar strip at Severnyy Polyus-4, flight operations began. Planes took off one after another, the first carrying prefabricated huts to Severnyy Polyus-5, and another taking heating stoves. This station also received a powerful diesel engine for the new power station, new scientific equipment, mail, and miscellaneous equipment. All necessary equipment and supplies were also delivered to Severnyy Polyus-4.

"The aerial detachment delivered cargo to the drift stations for 1 1/2 months, and each time a flight was made from the mainland the stations were found in new locations. At this time of year drift was especially rapid -- Severnyy Polyus-4, for example, moved 350 kilometers during the period of our operations.

"By the completion of the expedition's work, planes piloted by Zadkov, Osipov, Lebedev, Mazurak, and Vasil'yev had made 15-20 long flights."(7)

An October report from Severnyy Polyus-3 named Mys Chelyuskin as the shore point from which the supplies were flown to the station. This report mentioned a plane piloted by Kaminskiy, in addition to the ones mentioned above by Kotov.(8)

Radio and Postal News at Drift Stations

At the suggestion of the Moscow Post Office, postal points have been opened at Severnyy Polyus-4 and Severnyy Polyus-5. Aircraft have already delivered stamps, envelopes, and canceling machines to the stations. The envelopes carry a color representation of the station and were prepared on special order for the Ministry of Communications USSR.(9)

The two 1954-1955 drift stations Severnyy Polyus-3 and Severnyy Polyus-4 (radio call letters UPOL-3 and UPOL-4) made radio contact with a number of amateur radio stations in the USSR, including the amateur group at the Leningrad Arctic Institute (call letters UA1KAG).

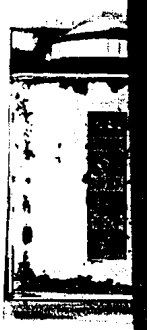
An amateur in Irkutsk received both Severnyy Polyus-3 (UPOL-3) in the arctic and the whaling flotilla Slava (USFA) in the antarctic on the same day.(10)

ARCTIC SCIENTIFIC AND ECONOMIC DEVELOPMENTS

Scientific Expedition Aboard the Litke

A complex scientific expedition of the Arctic Scientific Research Institute has been carrying out observations aboard the icebreaker F. Litke for 3 months. The basic task of the expedition is to complete a broad series of oceanographic observations in the strait between Greenland and Spitsbergen and the area to the north of the latter. Studies of this area are of particular interest since it is the main entrance for warm Atlantic water into the Central Arctic Basin as well as the main exit for cold water and ice from the Central Arctic Basin.

In spite of several expeditions completed in the past, the area of the strait, the area north of Spitsbergen, and the area north of Zemlya Frantsa Iosifa have remained largely unstudied.



The expedition aboard the Litke is under the leadership of L. L. Balakshin, who has taken part in many arctic expeditions, and the ship is under the command of Captain V. I. Potashnikov.

In the first weeks of operation, the expedition met with success when the F. Litke penetrated to lattitude 83-11 N and thereby established a new record for northerly penetration by a free vessel. The ship sailed more than 100 kilometers north of the lattitude at which the drift station Severnyy Polyus-5 was established and almost 800 kilometers north of the point at which the station Severnyy Polyus-4 was established.

After completing observations to the north of Zemlya Frantsa Iosifa, the expedition proceeded to work in the strait between Greenland and Spitsbergen. In two voyages, 150 oceanographic stations were taken, bottom samples were obtained, plankton samples collected, and meteorological observations made. Of special interest are the great number of hydrologic stations taken north of the 82d parallel and over the Nansen "submarine gate."

As a result of the systematic soundings completed, new data is available on bottom relief in the areas under study.

In the area to the north of Spitsbergen, beyond the 82d parallel, soundings were made in the depression located there and bottom samples were obtained. A depth of 5,449 meters was obtained there, the greatest depth in the western part of the Arctic Ocean.

Information obtained by the first two voyages of the expedition has been extremely valuable for studies on influx of warm water into the Arctic Ocean through the strait between Greenland and Spitsbergen and the egress of ice and cold water through this same area.

Conditions in the area under study are becoming extremely difficult, but the work of the expedition goes on.(42)

Underwater Television Camera

Experts at the Arctic Institute have successfully tested a new underwater television apparatus suitable for use in the polar regions. The cylindrical transmitter can be lowered to great depths on a cable and transmits images to a screen aboard ship. Silhouettes of fish were picked up from the ocean floor in tests which were successful by daylight and by searchlight.(11)

IGY Activities in the Arctic

V. G. Kort reports the following information on Soviet activities in the north in connection with the IGY program:

Soviet scientists will conduct research in the Norwegian, Greenland, and Bering seas, in the North Atlantic, the western half of the Pacific, and the Arctic Basin.

Over a hundred polar stations and the five observatories of the Arctic Scientific Research Institute will take part in the work dealing with the Arctic Ocean. The observatories are located in Barentsburg (Spitsbergen), Bukhta Tikhiya (Zemlya Frantsa Iosifa), Ostrov Dikson, Bukhta Tiksi, and Pevek. Three drift stations, including a projected Severnyy Polyus-6, will also take part in the program. The Polar Basin will be studied also by mobile research teams which will make observations at more than 500 points they will reach by aircraft. Automatic radio-meteorological stations will also be utilized for observations, as will the ships of the Soviet arctic fleet.(20)

Central Kolyma Road

The Central Kolyma Road runs more than 1,000 kilometers north from Magadan. Until recently this area was traversed only by deer, and the first industrial machinery was moved into the interior by sledge. Industries and settlements soon began to grow, however, and a good road was not far behind. Auto transport is now the basic means of communications in the area.

A vast amount of road servicing is required on the road, including powerful rotary snowplows, to keep it open. Every 50-60 kilometers along the road there is a restaurant and hotel with rest rooms, reading rooms, etc.

Moving north along the road, one passes settlements such as Zagadka, Staratel'nyy, Bodryy, Razvedchik, Spornyy, and others which are located on only the latest maps. These settlements have post offices, schools, houses, baths, stores, clubs, and libraries.

This area is one of contrasts. One emerges from the taiga onto the broad streets of Debin or the rayon center Yagodnoye. Moskvich and Pobeda automobiles drive between two-story buildings in these towns, and new buildings are being opened.(13)

Vorkuta Coal Mining

Coal mining in the Vorkuta basin is growing continuously, thanks in large part to new mine construction. Construction Administration No 2 of the Vorkutshakhtstroy (Vorkuta Mine Construction) Trust, Ministry of Construction of Coal Industry Enterprises USSR, is now striving for early completion of Vorkutugol' Mine No 32 with a yearly capacity of 600,000 tons.(14)

Soviet Superplanning

The Soviet superplanners have originated two projects for the arctic regions -- one for traversing the arctic basin and the other for transforming it.

The first of these was suggested by M. Chernov, deputy chairman of the Scientific-Technical Council, Ministry of River Fleet USSR, and Engr A. Bogdanov. Their project is the construction of an atomic-powered, transarctic passenger liner. This vessel (depicted in a drawing proceeding at high speed through the arctic pack) would be of 25,000 tons displacement, 40,000 horsepower [as compared to 34,000 horsepower in the SS America], and a speed of 45 kilometers per hour. Steam jets would extend from the ships bow for ice cutting purposes.(15)

The second project has been seen by FDD in children's publications as a theoretical suggestion, but it has appeared in the Czechoslovakian press in the following positive way:

"The immense possibilities of the peaceful utilization of atomic energy are attested to by a plan on which Soviet scientists and technicians are now working.

"The new plan involves the construction of a giant dam across the Bering Strait. This strait is 75 kilometers wide and 50-60 meters deep and is not penetrated by the warm Japanese current flowing from the south. The plan, therefore, calls for the dam to be equipped with large pumps, operated by a 2 million-kilowatt atomic power plant, which will pump warm water into the Arctic Ocean and create a new ocean current similar to the Gulf Stream. The realization of this plan would be equal to the discovery of a new land because the current would warm the arctic regions until their entire character would be changed." (44)

Geological Papers Submitted

The following two papers have been submitted to the Scientific Research Institute for Arctic Geology, Academy of Sciences, USSR:

M. F. Lebanov, "Silurian Deposits in Northern Verkhoyan'ye." Submitted 9 June 1955.

V. I. Ustritskiy, "Brachiopoda Groups From Permian Deposits in Eastern Taymir." Submitted in Leningrad, 2 June 1955.(12)

SOVIET ANTARCTIC EXPEDITION

Soviet press coverage of the antarctic expedition has been tremendous in volume with the information contained in this report repeated in one form or another in almost every newspaper and periodical seen in FDD. As noted earlier, the antarctic expedition has all but driven Soviet arctic research activities from the pages of USSR newspapers and periodicals.

It is of interest that most of the extensive articles on the antarctic and the Soviet expedition to that area reiterate two basic points: (a) Antarctica was discovered by the Russian expedition directed by Bellingshausen; and (b) Soviet interest in the antarctic regions is purely scientific. These articles generally also summarize the work of American expeditions under Admiral Byrd in a factual and complete manner.

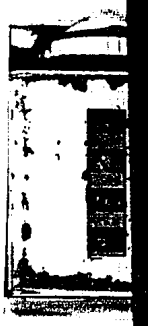
General Organization and Scientific Program

The Soviet Complex Antarctic Expedition has two main components -- marine and continental. The marine component contains detachments for hydrology, marine geology, chemistry, hydrobiology, and hydrometeorology. The continental component contains detachments for geology and geography, aerometeorology, and geophysics.(16) The scientific program is reported to have been approved by a special commission of the Academy of Sciences USSR under Chairman I. Bardin. (17)

About 70 men will winter at the main base camp Mirnyy [see appended map for location], and in 1956 they will begin preparations for establishing the two interior camps (16) -- Vostok, at about 78-30 S and 107 E, and Sovetskaya, at about 82 S and 55 E.(17) The interior of the continent will be studied by both aerial and land reconnaissance. The aerial detachment is under the command of Cherevichnyy and will require the construction of intermediate bases along flight routes to provide emergency landing strips with fuel, equipment, and provisions.(16) The land detachment is under the command of Ye. S. Korotkevich.(18)

In the period 1955-1959, the expedition's flagship, the Ob', will make four voyages to the antarctic. The main task of the marine component aboard the Ob' is to study the interaction between waters of the antarctic with those of the Atlantic, Pacific, and Indian oceans and the influence of antarctic water on atmospheric circulation in the southern hemisphere.

The Ob' will make her second voyage in 1956-1957 to carry out research in the Atlantic, Indian, and Pacific (as far as 160 W) sectors of the antarctic and in the western part of the Pacific during the crossing from Antarctica to Vladivostok.



The greatest volume of work will be carried out in 1958 when the IGY program is in full swing. From June to September of that year, the ship will circle Antarctica conducting oceanographic research.(16)

The following complete description of the Soviet scientific program in the antarctic was presented in an article by V. F. Burkhanov:

1. Studies on the influence of antarctic atmospheric processes on the over-all atmospheric circulation of the earth.

This division of work will include studies on the peculiarities of the barometric field and synoptic processes in the antarctic regions and their influence on general atmospheric circulation with the aim of completing methods for making long-range forecasts.

Collection of material on this subject is assured by systematic meteorological, aerological, and actinometrical observations at the south polar stations in the course of the entire year and on the expedition's ships during the navigation period.

For current analysis of synoptic conditions, a report summary will be produced using reports from meteorological stations of the southern hemisphere and daily synoptic maps will be published.

2. Basic rules for movement of antarctic water and its connection with general circulation of the world's oceans.

The task for research in this field includes studies on the heat and dynamics regimes of the south polar seas and the character of their water and heat interchange with surrounding seas and atmosphere, as well as the determination of a number of characteristics for making long-range forecasts.

Research on this theme is assured by complex oceanographic and meteorological observations carried out on the expeditionary ships along prescribed courses in the antarctic and along sailing routes from the USSR to the antarctic. Contributions will also be made by the hydrologic workers of the south polar observatory.

3. Geological structure and history of formation of the ocean bottom in the antarctic area.

Geological research in the antarctic will be composed of the following divisions:

a. Research on ocean bottom relief using sonic depth finders with the aim of making up new bathometric charts, shedding light on the geological structure and geomorphology of the ocean bottom, and helping to explain the connection between bottom relief and circulation of the ocean water. Particular attention will be accorded the question of submarine mountain ranges and depressions for comparison with analogous formations in more northerly oceans and seas.

b. Research on distribution and stratigraphy of bottom sediment with the aim of clarifying principles of sediment formation in antarctic waters and providing some answers to questions of geological history and paleography [presumably paleogeography] of the oceans of the world.

c. Research on the amount of friable bottom sediment using seismo-acoustical methods to aid in understanding the geological structure of the ocean bottom.

d. Research on the amount and type of suspended matter in the water and in the air to aid in studying the processes of sediment formation and other water mass characteristics.

4. Studies on the ice regime of antarctic waters.

Sea ice in the antarctic is of great scientific interest because it exerts an influence on atmospheric circulation and water mass dynamics, in addition to presenting a navigational hazard. Research on this subject will include work on the physical-mechanical characteristics of antarctic ice, the regime of the ring of polynyi on the approaches to Antarctica, and the role of icebergs in the formation of ice conditions. A method must be worked out for making very long-range forecasts of ice conditions.

5. Wave and swell studies in the south polar basin.

The south polar regions present a vast water area free from land, thus enabling winds to exert tremendous influence on the water. The task in this subject includes compiling instrumental data on wave elements, studying the relation of these elements to wind regime and ice conditions, and studying the speed with which waves develop and calm. These are important questions in the fields of navigation and shipbuilding.

6. Research on whale supply potential for antarctic whaling.

This branch of the program was dictated by a decrease in the stock of whales in the area currently worked by whaling ships.

Research on the subject is composed of studies on seasonal distribution of plankton and pelagic fish in the antarctic as well as characteristic distribution of various types of whales and the areas in which they feed.

7. Research on zonal distribution of fauna in the world's oceans.

Abyssal fauna are one of the least studied branches of biogeography. For this reason, particular interest is being shown hydrobiological research on meridional cross sections in the Atlantic and Pacific oceans, especially during the passage of the expedition's ships from northern latitudes to southern and return. The work will include systematic raising of marine organisms from various depths while under way.

8. Physical-geographic mapping and description of Antarctica.

The area of Antarctica in which the station will be organized has not been previously studied. The work in this branch will include, therefore, general maps of the territory (topography, glaciology, geomorphology) and of the physical-geographic characteristics of contemporary terrain and natural processes.

Observations will be made during trips (aerial and ground) and by aerial photography.

9. Studies on contemporary glacial cover of Antarctica and its dynamics.

Research on this theme will be composed of the following:

a. Studies on morphology of the glacial cover in relation to local relief and conditions of material intake and expenditure in glaciers.

b. Heat and material balance on the surface of the glacial cover, as well as the temperature regime of the glacial mass and upper layers of the earth's surface in areas free from ice.

c. Studies of the regime and characteristics of the snow cover and condition of the glacial surface in relation to meteorological conditions.

d. Studies on structure of the glacial cover (including outlet glaciers and shelf ice), and studies on the composition and structure of ice and firn [neve] and their physical-mechanical characteristics.

e. Research on the principles of ice movement in the glacial cover and in individual glaciers.

f. Studies on the geologic activity of the glacial cover, the history and contemporary evolution of freezing.

Studies on regions of the glacial cover and glaciers of various types will be carried out through regular observations at the scientific stations, as well as through aerial and ground expeditions doing mapping and terrain description of explored glaciers with the aid of aerial photography, radio leveling, seismic sounding, and test holes. Systematic observations will also be made on radiation and heat balance, both on the glacial surface and in the bored holes. Research will be carried out on the structure of snow, firn, ice, and frozen mountain rock.

Ice movement will be studied in the area of the scientific stations using observations along a special system of grids and polygons and marked points, and studies on movement at lower levels of the ice will be studied using electromagnetic inclinometers.

10. Geological characteristics and history of the antarctic regions.

Geological research on the mainland will be accomplished by reconnaissance of the territory free from ice near the stations (with attendant collections of moutain rock formations, paleontological collections, over-all schematic mapping of the basic elements of the geology and tectonics, and some radiometric measurements).

Geomorphological work will be carried out simultaneously on the surface areas which are free from ice, and studies will be made on contemporary endogenous processes and environmental-lithologic features of the frozen friable deposits and underground ice for determining the characteristics of the relief-forming process and genisis of various forms of relief.

11. Research on peculiarities of geophysical phenomena in the antarctic.

Research in this field will involve complex geophysical observations, including:

a. Determination of the acceleration of gravity both on the expeditionary ship and at work points on the mainland.

b. Seismic research in the antarctic region.

c. Studies on stability and variation in the antarctic geomagnetic field.

d. Studies on aurora for information on the connection between changes in the intensity of these lights and magnetic-ionospheric disturbances.

e. Studies on variation in the intensity of cosmic rays and their connection with meteorological and magnetic-ionospheric effects.

f. Research on the ionosphere in the antarctic by means of daily measurements of the critical thickness and current height of the ionosphere.

12. Biogeographic characteristics of Antarctica.

At all points where the expedition is working, collections will be made of flaura, fauna, and soils.(18)

Ye. Korotkevich, chief of the geology-geography detachment, has published some additional data on the activities of his group. The geology-geography detachment includes geologists, glaciologists, and geophysicists who will conduct complex research on the earth's crust and glacial cover with special emphasis on aeromagnetic survey and gravimetric work. Aerial photography will be used for mapping.

The continental component of the expedition will also include a geophysics detachment directed by P. K. Sin'ko, and a seismic station will be set up at Mirnyy containing the latest instruments of extreme accuracy.(19)

The oceanographic phase of the IGY has been summarized in the following article by V. G. Kort, director of the Institute of Oceanology, Academy of Sciences USSR, and chief of the marine component of the Soviet Complex Antarctic Expedition:

"In recent years, a great deal of progress has been made in the study of the world's oceans and seas. Soviet scientists, with the backing of the government and party, have been particularly successful in this field through the execution of a planned, systematic scientific program. This work has resulted in precise charts of the Soviet seas and the discovery of new islands in the north. Flights by Soviet polar fliers combined with the work of drifting and shore polar stations have produced a great deal of information on the Arctic Ocean itself. Important work has also been done in the northwestern part of the Pacific Ocean, in the antarctic, and in other areas.

"Soviet shipping, marine industries, shipbuilders, and port builders require still more information on the world's oceans, however. In this connection, the oceanographic component of the antarctic expedition is of special interest. This is particularly true because the research will be carried out simultaneously with research in all basins of the world's oceans and will be done by all countries participating in this phase of the IGY program. This is the first time in the history of the world that oceanographic research on such a scale has been carried out.

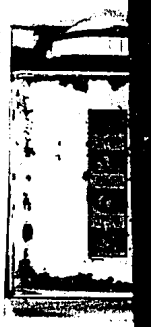
"In the course of the IGY, over 70 oceanographic ships belonging to various countries will be operating in the oceans of the world. These ships will be employing the very latest equipment for the pursuit of their research, including electromagnetic gauges, thermobathygraphs, and seismo-acoustical and sonic depth finders. These instruments will permit the completion of observations while the ship is under way and over a wide area in a short period of time.

"Soviet scientists will conduct research in the Norwegian, Greenland, and Bering seas, in the North Atlantic, in the western half of the Pacific Ocean, in the arctic basin, and in antarctic waters.

"During the voyages of the Ob' to the antarctic, hydrological profiles in the Atlantic Ocean from the shores of England to Antarctica will be completed three times. In 1958, while the Ob' is circumnavigating Antarctica, ships of other nations will be conducting research in the Atlantic, Pacific, and Indian oceans. At this time therefore, a survey of almost all the world's oceans will be completed in a comparatively short time.(20)

The program of the antarctic expedition was reviewed on 24 October at a meeting of the Scientific Council of the Arctic Institute under the chairmanship of A. F. Treshnikov.(43)

The Geographic Society USSR has organized a special commission for arctic and antarctic studies.(27)



Preparations and Departure

After extensive preparations, the antarctic expedition sailed on schedule amid general fanfare - the Ob' departing on 30 November and the Lena and Refrigerator ship No 11 on 14 December.

Prior to departure, a considerable amount of work was done on the Ob' to outfit her as the flagship of the expedition. A helicopter landing platform was built on the ship's stern, and new scientific and navigational instruments were added -- magnetic and gyro compasses, radar, course recorder, sonic depth finders, and electrodynamic log. The ship's radio will permit the expedition to communicate with any point in the world. All machinery and equipment on the ship are electrically operated, and control of the ship is automatic. The crew is quartered in warm, light, comfortable cabins, and the galley and buffet have been equipped with electric stoves.(21)

The nerve center for expedition preparations was the area dubbed "Antarctic Center" in the Glavsevmorput' (Main Administration of the Northern Route) building. Correspondent K. Kondrashov describes the Antarctic Center as "an operational staff headquarters or sometimes a long-distance telephone center, with calls flowing steadily to Tbilisi, Riga, Kaliningrad, Chelyabinsk, Kazan', and elsewhere, while a flood of telephone calls and telegrams arrives from plants and factories with reports on work completion or other matters." (16)

On 30 November, departure ceremonies were held for the Ob' in Kaliningrad. Those attending the ceremonies were addressed by V. F. Burkhanov, chief of Glavsevmorput' and Deputy Minister of Maritime Fleet; Logvinov, deputy chief of the Main Administration of the Hydrometeorological Service, Council of Ministers USSR; members of the port administration and city government; and expedition members M. M. Somov, V. G. Kort, and I. I. Cherevichnyy. The Ob' sailed from Kaliningrad at 1800 hours.(22)

[Photos of the Ob' prior to departure include: LI-2 aircraft being loaded on the Ob' (Photo No 195691); general view of the Ob' in Kaliningrad (195699); general view of the Ob' in Riga (195639); general view of the bridge of the Ob', after wheelhead, showing new instruments being installed (195692)].

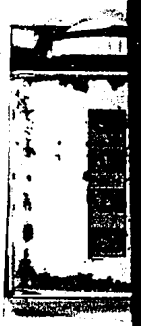
With the departure of the Ob', port workers in Kaliningrad devoted themselves to loading about 4,000 tons of the most varied cargo into the holds and on the decks of the Lena. This cargo included huts, cases with delicate instruments, batteries, clothing, tractors, cross-country vehicles, bulldozers, aircraft, and other items.(19)

On 11 November, the aircraft SSSR N-470 left Moscow for Kaliningrad where it would be dismantled and loaded on the Lena. This plane, like all those going on the expedition, had been fitted with additional heating equipment and cabin insulation.(23)

As departure time for the Lena approached, members of the expedition began to arrive in Kaliningrad where they were quartered at the Moskva Hotel on Stalin Prospekt.(18)

As loading completed on 14 December, hundreds of persons gathered in front of the Kaliningrad port administration building for departure ceremonies.(19) These ceremonies were attended by V. F. Burkhanov; Ye. I. Tolstikov, deputy chief of Glavsevmorput'; A. N. Budkin, deputy chief of the Political Administration, Ministry of Maritime Fleet USSR; I. D. Papanin; B. G. Chukhnovskiy, senior polar flier; and V. I. Ushakov, Chief Marine Inspector, Academy of Sciences USSR.

On 14 December, the Lena left Kaliningrad with the aid of tugs to start her long voyage to the antarctic.(24)



Equipment To Be Used in the Antarctic

The designs for living huts, warehouses, and service buildings being used in the antarctic were developed by Arktikproyekt ["Arctic Design" -- probably an administration or bureau] and the design bureau of Glavstandartdom (Main Administration of Standard Housing Construction, Ministry of Construction Materials Industry USSR).

The 1954 model panel hut was taken for a basis of these new plans, but major changes were made in them. It was apparent that the huts would have to be adapted to the extremely severe climate of the antarctic with winter temperatures of 60 degrees below zero and lower and very strong winds. A hut of high strength and tightly sealed would therefore be required.

Prior to establishment of the base camp in Antarctica, it was impossible to count on being able to locate on ice-free land; it was considered more likely, as scientists suggested, that the camp would be located on a glacier. The hut designers were faced with the problem, therefore, of designing a rigid hut foundation adaptable to the distortions in the glacial surface.

The hut decided upon [Photo No 195694; drawing of the hut] is designed for 10 men and has an over-all area of 47 square meters.(25) Operational personnel of the expedition usually refer to the huts as having a capacity of "around 60 square meters."(26) In addition to living space, the hut has a kitchen, a storeroom, inside vestibule, and outside vestibule-tower about 7 meters high. In case of heavy snow cover, personnel in the hut can reach the surface through this tower.

Each of these buildings is made up of 45 different parts. The foundation, composed of 0.5-meter-high metal beams, is laid first. A wooden platform 130 millimeters thick is then placed on the foundation, and the platform is covered with 16 layers of heat-insolating wood fiber sheets and floor panels.

The hut walls are made up of 8-millimeter-thick plywood panels, water-resistant on both sides, and covered with seven layers of heat-insulating wood fiber sheet. To increase strength and to improve the seal against wind, the walls are covered with additional layers of specially treated wood fiber facing.

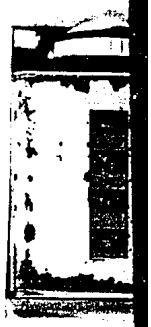
The roof is flat and is made up of a number of panels covered with a heavy layer of wood fiber sheet and topped with sheets of aluminum.

The panel seams are overlapped with sheet rubber. Foundation and cornice corners are overlapped with wood fiber sheets covered with aluminum. The small windows contain four layered Stalinite [sic] set in special rubber gaskets.

The living and service buildings will be set in a circle at the camp. Within the circle, tunnel corridors will be built connecting all huts, the company room, and the service areas. The tunnels will be made with a metal frame covered with canvas. The huts are provided with central heating.

Eighteen of these huts are being prepared in the Kharkhov Plant for Standard House Production. One hundred builders will accompany the expedition to the antarctic in order to construct the base camp.(25)

A second type of hut is reported under construction for the expedition by the Strel'ninskaya Shipyard in Leningrad and the "Sovetskiy" Timber Plant. This hut is described as having panels 30 millimeters thick, and its dimensions are listed as 4.4 meters in length, 2.5 meters in width, and 2.25 meters in height. Its area is 12.22 square meters and its weight is 1,100 kilograms. (27) Another report calls these "Shaposhnikov huts" and notes that several tons of penoplast were prepared for them in Astrakhan.(16)



[Comment: The dimensions given for these huts are very close to those of the original four-man Shaposhnikov hut used in the Arctic in 1954 (see 00-W-31172, page 8), although these were reported to be unsuitable for several reasons. It may be that they are instead modeled after the Mazuruk-Pappe adaptation of the Shaposhnikov hut (see 00-W-31114, page 7) or that Shaposhnikov has designed a new structure. Reports from the expedition make no mention of these smaller huts.]

Another important item of equipment developed for the expedition is clothing. Clothing used by inhabitants of the Far North was studied closely by Soviet scientists. These people wear deer hides, and freezing is almost never observed among them even though they sleep on the snow in the open. It was decided, however, that clothing from a single deer hide would be insufficient for the severe conditions encountered in the antarctic.

Many other materials and variations of them were tested, and eider down was finally chosen as a basic material. Eider down is extremely light -- 100 grams suffice for a winter overcoat lining, for instance. Each set of clothing provided the antarctic expedition requires 700-800 grams of eider down in addition to the wadding and camel's hair used.

The clothing was tested by dressing expedition members in it and placing them in a test chamber with a temperature of 42 degrees below zero. Wires were run from the clothing to instruments on the outside of the test chamber. The test personnel remained in the chamber at this temperature for 1 1/2 hours playing chess -- the game interrupted only by a strong wind provided by a fan. [Photo No 152815 shows interior of test chamber with subject dressed in new equipment.]

These tests pointed out several weaknesses in the garments which were immediately remedied. In general, the equipment tested out very well.(28)

This eider down clothing has been prepared by the sewing-knitting combine imeni VTsSPS, hide boots were produced by the "Burevestnik" factory, and the Kazan "Spartak" factory supplied fur boot liners.(16)

Additional equipment for the antarctic expedition has been supplied as follows:

A hundred pair of skis were sent from Nakaslavo, diesel motors from Barnaul, TZ-3 pumps from the Chusskiy Pump Plant, 20 complete diving outfits from Ufa, and AC-DC electric motors from the Kharkov "[illegible]" Plant.

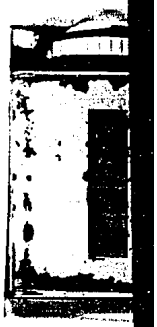
The Moscow "Gosteasvet" Plant has supplied tape recorders.

The Main Administration of Radio Information of the Ministry of Culture USSR has supplied films to the expedition and a large group of phonographs was sent by the Aprelevka Plant. The biology detachment has received hundreds of rings for tagging birds in the antarctic, and special rings for marking penguins have been ordered.(16)

The experimental shops of the Arctic Institute have prepared magnetic and other equipment, and the shops of the Main Geophysical Observatory imeni A. I. Voyeykov have produced apparatus for meteorological and other observations.(27)

Many plants in Vitebsk have received orders from the expedition. The measuring instrument plant is preparing a large complex of small-capacity panels for E-421 type instruments and portable M-57 ammeters. The machine building plant imeni Komintern has produced a group of precision drills.(25)

Dog teams were supplied to the expedition from the Kolyma River area.(30)



Expedition Personnel

The Soviet Complex Antarctic Expedition, under the over-all direction of M. M. Somov and his deputy, V. G. Kort (marine component), includes the following personnel:

Crew members of the diesel-electric ship Ob'

Captain -- I. A. Man

Staff Captain (Kapitan Dubler) -- A. F. Pinezhaninov (31)

Chief mate -- V. A. Tkachev (32)

Ship's doctor -- K. Chelnavskiy (33)

Boatswain -- P. Tsvetkovyy (26)

Chief engineer -- I. P. Belov (30)

Crew members of the diesel-electric ship Lena

Captain -- A. I. Vetrov (34)

Staff Captain -- N. Inyushkin (35)

Chief mate -- K. Chubakov

Boatswain -- I. Makarov (30)

Chief electroengineer -- N. Baranov

Diesel engineer -- Karpushkin

Chief diver -- Yemel'yanov

Enginemen -- Nekrasov, Yel'tsin (35)

Electrician -- Kuz'min, Bayborodin

Seamen -- V. Kobashov, I. Chumak

Expedition members and their specialties

G. M. Tauber -- chief, aerometeorology detachment

V. K. Babarykin -- aerology

V. Ye. Shchekin -- aerology

N. P. Rusin -- aerology (19)

M. Pogrebnikov -- aerometeorology

Ye. Korotkevich -- chief, geology-geography detachment

A. Lisitsyn -- chief, marine geology detachment

A. Zhevaga -- senior scientific worker, marine geology

V. Arsent'yev -- chief, hydrology detachment (36)

P. K. Sin'ko -- chief, continental geophysics detachment (19)

Ye. Sumyumov -- expedition scientific secretary (30)

A. N. Bogoyavlenskiy -- chief, hydrochemistry detachment

R. F. Usmanov -- aerometeorology (31)

K. M. Yakubov -- deputy chief, Mirnyy (30)

N. Tatarinov -- dog driver accompanying dogs aboard Lena (19)

I. Magnitskiy -- chief, radio detachment

A. Rokach -- radioman

Ye. Vetrov -- radioman

P. Romanov -- radioman

P. Tselishchev -- radioman (36)

Kh. Greku -- chief, base camp Mirnyy (26)

M. S. Komarov -- chief, surface transport and shops

A. Mikhaylov -- doctor

N. Paleyev -- doctor

I. A. Istomin -- cook (36)

L. G. Sobolev -- chief, aerometeorology detachment aboard the Ob' (30)

M. Klenov -- geology, mineralogy (19)

The following scientists of major stature are accompanying the expedition probably as consultants or for special research rather than as staff members of the regular detachments:

Dr of Geographic Science K. K. Markov -- geography

Dr of Geographic Science P. Shumskiy -- glaciology

Academician O. Vyalov, Academy of Sciences Ukrainian SSR -- geology, paleontology (36)

Dr of Biologic Science P. V. Ushakov -- biology

Dr of Physical-Mathematical Science A. M. Gusev -- synoptics

Dr of Biologic Science A. P. Andriashev -- biology [ichthyology]

Dr of Geographic Science G. A. Avsyuk -- glaciology (31)

A published letter of thanks to all contributors to the expedition was signed by several expedition leaders including V. Golubev, referred to as a deputy chief of the expedition (34); however, he has not been mentioned elsewhere as a deputy chief or in any other capacity. V. G. Kort is the only deputy chief generally referred to as such.

Some background information on the members of the expedition is provided in the following report by correspondents Kondrashov and Zakharov:

"In the Second International Polar Year which took place in 1932-1933, the Soviet expeditionary ship Persey sailed to the north with a scientific expedition under the direction of Mikhail Pavlovich Somov, the father of Mikhail Mikhaylovich Somov, chief of the present antarctic expedition. M. M. Somov was a student in the Moscow Hydrometeorological Institute during the years of his father's polar activity. Before the institute he worked for several years as a lathe operator in a machine shop and then as a laboratory worker in the Pacific Ocean Institute of Fish Economy and Oceanography. The Soviet people know M. M. Somov as the chief of the drift station Severnyy Polyus-2.

"The USSR will send a total of about 350 men to the antarctic -- 63 men in the crew of the Ob', 123 men in the expedition itself, another 100 men included in the auxiliary group, and 60 men in the crew of the Lena.

"The personnel of the expedition represent all the 'polar professions.' At the inland station near the pole of relative inaccessibility, Dr of Physical-Mathematical Science A. M. Gusev will conduct research. Gusev is known not only as a scientist and synopticist, but as an alpinist as well.

"The air detachment is commanded by the experienced polar flier, Ivan Ivanovich Cherevichnyy, who will be aided in his work by young arctic pilots such as Guriy Sorokin.

"The auxiliary group, which contains engineers and workers of various specialties, will build settlements, airstrips, and scientific stations.

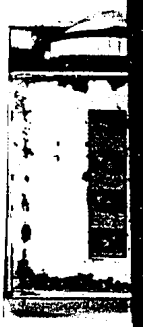
"Mikhail Semenovich Komarov, who is in charge of surface transport and shops, is an experienced arctic worker and was a member of the drift station Severnyy Polyus-3.

"The expedition's ships are commanded by captains with long experience. Ivan Aleksandrovich Man, captain of the Ob', has crossed the Northern Sea Route many times, and Aleksandr Ivanovich Vetrov, captain of the Lena, was formerly stationed on the icebreaker Litke.

"Ye. Korotkevich, chief of the geology-geography detachment, has taken part in many arctic expeditions. M. Pogrebnikov, a member of the aerometeorology detachment, has journeyed many times by air and by sea into the Far North, and as a geophysicist and astronomer he took part in the high lattitude expeditions which established Severnyy Polyus-2, Severnyy Polyus-3, and Severnyy Polyus-4.

"Matters of health will be watched by A. Mikhaylov, who has worked for many years as a polar doctor, and N. Paleyev, who spent a year at Severnyy Polyus-4. While at the drift station, Nikolay Paleyev began working on a dissertation entitled "Acclimation of Man Under Conditions of the Far North." His observations at the other end of the earth will considerably broaden his knowledge in the field of polar medicine.

"Ivan Aleksandrovich Istomin follows a modest but absolutely necessary profession -- he is the cook. His meals are remembered with pleasure in Bukhta Nordvik, Bukhta Tiksi, Ostrov Kotel'nyy, Mys Shmidta, Ostrov Genrietta, and elsewhere.



"Along with these and the other experienced personnel, there will be a few who will see ice conditions for the first time on this expedition. The radio detachment includes A. Rekach who has never visited the arctic. He will work along with such experienced men as I. Magnitskiy, Ye. Vetrov, P. Romanov, and P. Tselishchev.

"Each man taking part in the expedition is an expert in his field. A. Lisitsyn has been designated chief of the geology detachment (studying the ocean bottom) because he has taken part in similar work aboard the Vityaz' on four occasions. A. Zhevaga is going as senior scientific worker of this same detachment because he has already worked on the ocean floor as a diver dozens of times.

"V. Arsent'yev is chief of the hydrology detachment because he has been to the antarctic three times since 1948 as director of scientific research with the whaling flotilla Slava.

"The expedition includes a number of outstanding scientists including Oleg Stepanovich Vyalov, a member of the Academy of Sciences Ukrainian SSR. O. A. Vyalov took part in his first expedition about 30 years ago when he carried out paleontologic research on the Bol'shoy Balkhan Range and described the tertiary mollusks of Ustyurt. He has also completed studies on the paleontology of Central Asia (for research on oil), constructed a scheme of stratigraphs and tectonics for the Kumroch Range on Kamchatka, and did other studies in China and in the Carpathians.

"Oleg Stepanovich is one of the oldest members of the expedition; one of the youngest is Andrey Kapitsa, who is 24 years old. Son of Academician Physicist P. Kapitsa and grandson of Academician Shipbuilder A. Krylov, Andrey Kapitsa has chosen Geology-geophysics as his specialty. He took part in expeditions to the Far North while still a student."(36)

[Illustrations include: I. A. Man, captain of the Ob' (Photo No P-71257); M. M. Somov, director of the expedition (P-71258); A. I. Vetrov, captain of the Lena (P-71258)]

The entire continental contingent of the expedition, the hydrobiology detachment of the marine component, the construction workers, and a number of other specialists were transported to the antarctic aboard the Lena. The remainder of the expedition, including its leaders, was transported aboard the Ob'.(35)

It should be noted that the personnel designations listed in the above section cannot be accepted as final or completely accurate. It was shown in initial press coverage of the 1954-1955 arctic expedition that Soviet correspondents are not always clear on group divisions and responsibilities at the outset. It was not unusual for one writer to refer to an individual as the "chief of the hydrology detachment," another writer to call him "chief of the hydrobiology section of the hydrology detachment," and so forth. As time goes on, however, the correspondents will become more informed on these matters, and divisions and personnel responsibilities can be definitely established.

Under Way for the Antarctic

As the Ob' and the Lena proceeded from Kaliningrad to the antarctic, a great deal of time was spent setting up and testing equipment and instruments. Aerometeorological observations were made regularly on both vessels as they proceeded to the south.(35, 37)

Members of the expedition aboard the Ob' were addressed in the evenings by various scientists on aspects of the antarctic.

Appropriate ceremonies were held when the ship crossed the equator, with V. G. Kort serving as King Neptune.(38)

The Ob' put in at Capetown where the crew visited the city "amid a general welcome." Somov held a press conference aboard the ship.(39)

Arrival at Antarctica

On 3 January, the Ob' was reported to be entering antarctic waters and the initial stage of the Soviet Complex Antarctic Expedition was almost over.(40)

The arrival of the ship and the initial activities of the expedition are best described in three radio reports received directly from the Ob.' The first of these, covering the ship's arrival at the mainland, was sent by the chief mate of the Ob', Tkachev:

"M. M. Somov, chief of the expedition, I. A. Man, captain of the Ob', and A. F. Pinezhaninov, staff captain, were on the bridge as the ship approached the mainland. We were met by countless numbers of huge icebergs which demanded skill and courage on the part of the captain and crew of the vessel.

"Leaving the vast fields of bergs behind, the Ob' forced a rather narrow field of floating ice which blocked the route to Drigalskiy Island, a small piece of ground covered with ice which made it resemble an iceberg.

"Threading her way through the icebergs which surrounded the island, the Ob' set out for the shore of Antarctica. We began to look for a suitable landing place. On the evening of 4 January, we reached open water but fog closed in until we could see just the outline of land.

"During the night of 5 January, snow and fog made progress impossible, and the ship lay drifting. In the morning, however, the sun was bright and we could see the land nearby. There were seals and sea leopards on the floating ice around us.

"The Ob' proceeded then to the ice barrier -- the Shakleton Ice Shelf, which reaches miles into the Indian Ocean like a great bridge. Moving along this wall of ice, we reached Depo Bay which had been studied by the Australian expedition of 1911-1914.

"Keeping Helen Glacier on our right, the Ob' proceeded to force several bridges of pack ice. There was a great deal of excitement among the crew, scientists, airmen, and construction workers as they saw the icy slopes of Antarctica. Directly before us was Queen Mary Land where it joins William II Coast.

"Soviet expedition members landed on the coast of Antarctica at Depo Bay to inspect the area. Using skis, a group of scientists including V. G. Kort, A. M. Gusev, G. A. Avsyuk, and P. A. Shumskiy set out to survey the area around the ship.

"Depo Bay is located near the Antarctic Circle at 66-30 S and 94-20 E. To the east of the bay is the Shackleton Ice Shelf and to the west is the projecting tongue of Helen Glacier. From Depo Bay the expedition will carry out reconnaissance for locating the base camp Mirnyy. Members of the group are now preparing the airplanes and helicopters for this work.

"The long voyage has been completed and the Soviet antarctic expedition is now ready to fulfill the broad program of scientific study."(41)

A second report was received from Tkachev some 3 days later, as follows:

"The Ob' has penetrated far enough into the fast ice of Antarctica to reach ice sufficiently thick to permit unloading of aircraft, tractors, and other equipment. Members of the expedition have decended onto the broad field of ice, and the chief of the aerial detachment, I. I. Chervichnyy, and his pilots, navigators, and mechanics have begun inspecting the future airfield. A case containing the AN-2 reconnaissance aircraft has been lowered to the ice from the foredeck. Pilot A. Kash, Flight Engineer M. Chagin, and other members of the aerial detachment have begun to assemble the plane.

"Before the Ob' even arrived in Depo Bay, we organized an alpinists detachment which has already landed in order to lay out a route through the piles of ice. About 2 miles from the Ob' a rock ledge was spotted behind an ice cliff and a glacier descended from it to the fast ice at the left of the ship. The survey party under the command of A. M. Gusev, famous alpinist as well as scientist, moved along the fast ice on skis. Reaching the foot of this glacier, the skiers began to ascend its rather steep slope. From the slope they could see the Davis Sea, the Ob' at the edge of the ice, and the shores of Depo Bay. Proceeding up the glacier, the alpinists discovered a deep crevasse covered by the snow. Their route was then obstructed by a great abyss, and they were forced to return to the fast ice. The group then assaulted the glacial face once more, and when they finally succeeded in ascending it they found members of great granite boulders deposited by the glacier as it moved from the land to the sea.

"Returning to the ship, V. G. Kort, A. M. Gusev, K. K. Markov, and the remaining alpinists reported their findings to the director of the expedition, M. M. Somov.

"When the AN-2 was assembled and placed on skis, flight preparations were made, but the weather turned unfavorable for these plans. The sky became overcast with dark clouds and a purga began. Hurricane-force winds began to break up the fast ice and the emergency flag was raised. Members of the expedition immediately descended to the ice and the AN-2 was raised aboard the ship again while all gear on deck was simultaneously dogged down against the wind.

"When the weather improved on the following day, a survey party was sent ashore under M. M. Somov, and the first tent was raised on the mainland of Antarctica.

"The AN-2 reconnaissance plane was lowered onto the ice and moved away from the ship by tractors. The helicopter then took off from the stern platform and circled over the bay before landing on the ice near the Ob' -- the first helicopter flight was successfully completed.

"Survey of the continental area is continuing in search of a suitable location for the base camp Mirnyy."(42)

A third report, by Ye. Suzyumov (expedition scientific secretary) and Tkachev, relates the final locating of a camp site:

"The search for a camp location continued for some time, with the aircraft crews under Cherevichnyy reporting poor conditions on the mainland because of widespread crevassing in the surface and ice piling.

"A. Kash, pilot of the AN-2 aircraft, made numerous flights to the west accompanied by M. M. Somov, I. Man, A. Pinezhaninov, I. Cherevichnyy, and other specialists. Hundreds of kilometers were flown altogether along the shore of Queen Mary Land, and during these flights the attention of the observers was drawn to the coastline of the Davis Sea lying to the west of Depo Bay. In the area beyond Helen Glacier and south of the Haswell Islands, the observers spotted flat peaks of granite cliffs jutting out in several places from under the glacial sheet. The AN-2, with a large number of polar workers aboard, made a series of flights to this area in order to determine its suitability for establishment of the station and the possibility of the ships' approaching the shoreline in that area. This area was carefully studied by Kh. Greku, the chief of the projected settlement, V. Somov, director of the construction-assembly detachment, and hydrologists. In a round tent, so well known to the drift station workers, a radio station was set up.

"The chief of the radio detachment, I. Magnitskiy, communicated with the Ob' and informed her of the preliminary survey results, while Staff Captain A. Pinezhaninov lead the hydrologists in studying crevasses and strength of the fast ice. This group carried out depth measurements and marked a fairway by which the Ob' could approach the unloading point.

"At a meeting of the expedition's scientific council, it was decided to organize the first Soviet antarctic base, the observatory Mirnyy, in this area. Accordingly, the Ob' was moved from Depo Bay to the new location through uncharted and unexplored waters. Beginning in the evening of 14 January, the ship sailed around the Helen Glacier tongue, picking her way through multitudes of icebergs and the rocky Haswell Islands. Of the 16 small islands in this group, only three are noted on the maps.

"Successfully averting all obstacles both on the sea and below it, the Ob' approached the fast ice near the base location at noon on 15 January and began forcing a passage toward the shore. After breaking a lead almost 1/2 kilometer long in the 1 1/2-meter-thick ice, the Ob' halted at a distance of less than 100 meters from the shore. The following coordinates were noted in the log: 66-37 S and 92-57 E.

"To permit rapid unloading of the ship, a road was required from the shore to the camp site. The deck force, under Boatswain P. Tsvetkovyy, began unloading tractors and cross-country vehicles onto the ice immediately, while construction workers began cutting a road in the ice barrier. The first explosions rent the air while tractors and sledges began moving away from the ship. The sledges were loaded with prefab huts, building timber, provisions, and radio station equipment.

"Our task was to unload several thousand tons of cargo from the Ob' -- a store of cargo which would be increased further with the arrival of the second ship, the Lena.

"The construction workers and the director of the expedition began laying out the plan for the polar settlement. A street formed by the huts will run parallel to the shore.

"On 16 January, a long exploratory flight was made in a two-motor LI-2 aircraft piloted by Cherevichnyy and Sorokin. The deputy chief of the expedition, V. Kort, and the doctors of geographic science, K. Markov and P. Shumskiy, took part in the flight. Interesting data was gathered on the Shackleton Ice Shelf, its structure, and its geographic position."

"About 70 persons will winter in at the base camp Mirnyy."(26)

(See appended map for location of Mirnyy.)

Slava Returns to the Antarctic

It was reported toward the end of September that the whaling flotilla Slava was preparing to make its tenth voyage to the antarctic. A scientific ship is accompanying that flotilla as usual to carry out work on ice cover, oceanography, and meteorology.(45)

On 7 January 1956, the flotilla was reported to be approaching the antarctic pack. The scientific group with the flotilla is transmitting information on weather, ice, and seas directly to Moscow.(46)

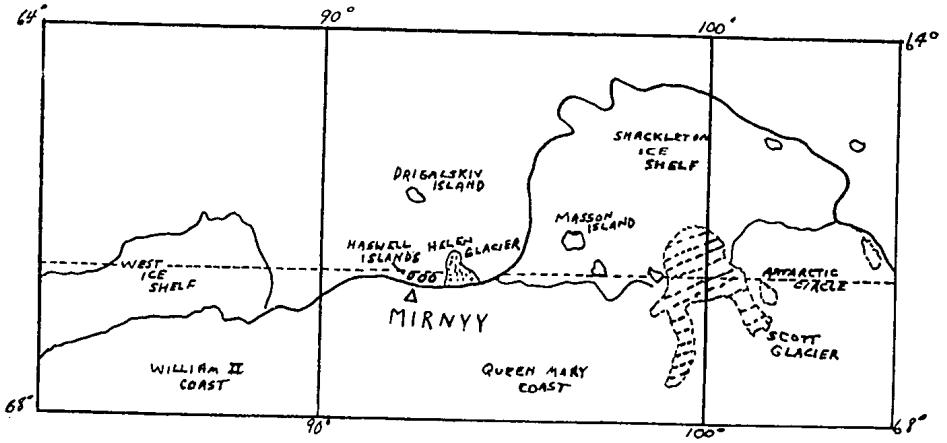


Fig 1. Location of Soviet Base Camp Mirnyy (26)

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SOURCES

1. Frunze, Sovetskaya Kirgiziya, 4 Nov 55
2. Moscow, Vechernyaya Moskva, 6 Nov 55
3. Moscow, Trud, 4 Nov 55
4. Baku, Bakinskiy Rabochiy, 18 Sep 55
5. Leningradskaya Pravda, 26 Oct 55
6. Moscow, Krasnaya Zvezda, 24 Dec 55
7. Vechernyaya Moskva, 18 Nov 55
8. Moscow, Izvestiya, 21 Oct 55
9. Vechernyaya Moskva, 31 Oct 55
10. Moscow, Radio, No 11, Nov 55
11. Vienna, Oesterreichische Volksstimme, 13 Jan 56
12. Moscow, Doklady Akademii Nauk SSSR, Vol 105, No 4, 1 Dec 55
13. Moscow, Sovetskaya Kultura, 3 Nov 55
14. Moscow, Stroitel'naya Gazeta, 21 Oct 55
15. Moscow, Tekhnika Molodezhi, No 11, Nov 55
16. Moscow, Vodnyy Transport, 29 Nov 55
17. Moscow, Ogonek, No 49, 4 Dec 55
18. Moscow, Morskoy Flot, No 12, Dec 55
19. Vodnyy Transport, 15 Dec 55
20. Moscow, Sovetskiy Flot, 23 Nov 55
21. Izvestiya, 24 Nov 55
22. Moscow, Pravda, 1 Dec 55
23. Vechernyaya Moskva, 21 Nov 55
24. Izvestiya, 15 Dec 55
25. Stroitel'naya Gazeta, 26 Oct 55
26. Vodnyy Transport, 19 Jan 56
27. Leningradskaya Pravda, 16 Nov 55
28. Trud, 25 Nov 55
29. Minsk, Sovetskaya Belorussiya, 4 Dec 55
30. Vodnyy Transport, 13 Dec 55
31. Pravda, 30 Nov 55
32. Trud, 21 Oct 55
33. Moscow, Moditsinskiy Rabotnik, 4 Nov 55
34. Vodnyy Transport, 4 Dec 55
35. Ibid., 12 Jan 56
36. Moscow, Literaturnaya Gazeta, 29 Nov 55
37. Izvestiya, 11 Dec 55
38. Pravda, 11 Dec 55
39. Ibid., 27 Dec 55
40. Vodnyy Transport, 3 Jan 56
41. Ibid., 7 Jan 56
42. Ibid., 1 Nov 55
43. Bakinskiy Rabochiy, 27 Oct 55
44. Prague, Rude Pravo, 13 Nov 55
45. Vechernyaya Moskva, 27 Sep 55
46. Vodnyy Transport, 7 Nov 55
47. Sovetskaya Belorussiya, 27 Nov 55

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